REMARKS

Reconsideration of this application is respectfully requested. Applicant has addressed every ground for rejection in the Office Action dated August 13, 2004, and believes the application is now in condition for allowance.

1. The Objection to the Specification For Failure to Provide an Adequate Written Description of the Invention under 35 U.S.C. §112, First Paragraph, Should be Withdrawn.

The specification is objected to under 35 U.S.C. 112, first paragraph on the basis that the Examiner believed it fails to provide an adequate written description of the invention. The written description requirement requires a determination of "whether the description clearly allows persons of ordinary skill in the art to recognize that he or she invented what is claimed" (In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989), MPEP 2163.02). The phrase that the diffusing medium "is substantially transparent to neutrons" has been removed from Claims 1 and 17. It is respectfully submitted that, for the reasons set forth herein and in prior arguments, the specification provides a written description of what is claimed to permit one skilled in the art to know what Applicant is claiming as its invention. Accordingly, it is respectfully submitted that this rejection is traversed and should be withdrawn.

2. The Objection to the Specification for Failure to Provide an Enabling Disclosure under 35 U.S.C. §112, First Paragraph, Should be Withdrawn

The enablement requirement requires a determination of whether the disclosure when filed "contained sufficient information regarding the subject matter of the claims as to enable one skilled in the pertinent art to make and use the claimed invention" (See Mineral Separation v. Hyde, 242 U.S. 261, 270 (1916), MPEP 2164.01). As with the

written description requirement, the Examiner is required to determine how one skilled in the art would interpret and understand the specification and claims.

The phrase that the diffusing medium "is substantially transparent to neutrons" has been removed from Claims 1 and 17. It is respectfully submitted that, for the reasons set forth herein and in prior arguments, the specification provides a disclosure to enable one skilled in the art to practice the claimed invention. Accordingly, it is respectfully submitted that this rejection is traversed and should be withdrawn.

3. The Rejection of Claims 1-9, 12, 17-25, 28 and 31-32 for Failure to Provide an Adequate Written Description of the Invention under 35 U.S.C. §112, First Paragraph, Should be Withdrawn

Applicant asserts the same arguments from above used for the objection to the specification for a lack of written description. Thus, Applicant submits that due to those arguments, the rejection of claims 1-9, 12, 17-25, 28 and 31-32 under 35 U.S.C. §112, first paragraph, for lack of written description has also been overcome, and the rejection should be withdrawn.

4. The Rejection of Claims 1-9, 12, 17-25, 28 and 31-32 for Failure to Provide an Enabling Disclosure under 35 U.S.C. 112, First Paragraph, Should Be Withdrawn

Applicant asserts the same arguments from above used for the objection to the specification for a lack of an enabling disclosure. Applicant submits that due to those arguments, the rejection of claims 1-9, 12, 17-25, 28 and 31-32 under 35 U.S.C. §112, first paragraph, for lack of an enabling disclosure has also been overcome, and the rejection should be withdrawn.

5. The Rejection of Claims 1-9, 12, 17-25, 28 and 31-32 for Containing "Subject Matter which was not Described in the Specification in Such a way as to Reasonably Convey to One Skilled in the Relevant Art that the

Inventor(s), at the Time that the Application was Filed, had Possession of the Claimed Invention" under 35 U.S.C. §112, First Paragraph, Should be Withdrawn.

The Examiner asserts that "inner buffer region" and "outer buffer region" alternatively recited in claims 1, 5, 17 and 20 are not supported by the specification because these terms read on a single buffer having an inner and outer layer or region, wherein the specification only discloses separate and distinct buffers.

In response, claims 1, 5, 17 and 20 recite, in relevant part, a "diffusing medium...includes...an inner buffer region" (or "outer buffer region" depending on the claim). It does not recite that the regions are regions of a single buffer. "During patent prosecution, the pending claims must be given the broadest reasonable interpretation consistent with the specification" (See In re Morris, 127 F.3d 1048, 1054, 44 USPQ2d 1023 (Fed. Cir. 1997) (MPEP 2111, 2173.05(a), emphasis added).

Furthermore, while Figs. 7a and 7b show lines to indicate the positions of the layers or regions 3, 4 and 5, it is clear from the specification that these layers may be made from a single diffusing medium since they are all made from the same material (and it is further suggested throughout the specification. See e.g. page 2, lines 11-13 and 26-29). Each layer merely has a specific or additional purpose as described above. They are therefore properly referred to as layers and regions (see page 51, lines 22-23; page 53, lines 9 and 26; page 54, lines 15-16, page 2, lines 11-13).

In addition, the terms "layer" and "region" themselves are not limited to some sort of physical separation. Here, the claimed terms simply refer to the relative position and purpose for the regions/layers. A first or inner buffer layer or region 3 is positioned around the target 11, while a lead buffer layer 5 is positioned "outside" from the inner

buffer layer 3. Thus, the claimed terms are completely consistent with Figs. 7a-7b and the description on pages 51-56 of the specification.

For these reasons, and the reasons set forth before, Applicant respectfully request that the rejection of claims 1, 5, 17, and 20 under 35 U.S.C. 112, 2nd paragraph as indefinite be withdrawn.

6. The Rejection of Claims 1-9, 12, 17-25, 28 and 31-32 under 35 U.S.C. §112, Second Paragraph, as Indefinite Regarding the Terms "Inner Buffer Region" and "Outer Buffer Region" Should be Withdrawn.

Applicant repeats the argument from above for the 35 U.S.C. §112, first paragraph, rejection here, and submits that is 35 U.S.C. §112, second paragraph, rejection of claims 1-9, 12, 17-25, 28 and 31-32 for indefiniteness regarding "inner buffer region" and "outer buffer region" has been overcome for the reasons mentioned above.

7. The Rejection of Claims 1-9, 12, 17-20, 23-25 and 28 as Anticipated by Bowman (U.S. Patent No. 5,160,696) Under 35 U.S.C. §102(B) Should be Withdrawn.

Claims 1-9, 12, 17-20, 23-25 and 28 stand rejected under 35 USC Section 102(b) as anticipated by Bowman U.S. Patent No. 5,160,696. Bowman discloses a lead-bismuth target surrounded by a blanket medium with molten salt containing fissionable material, fertile material, material to be transmuted, etc. (column 8, lines 12-16). More specifically, and while referring to figure 4 of Bowman, incoming high-energy protons 80 are introduced into an enclosure 84 containing a lead-bismuth mixture circulated around a loop 88 (col. 11, lines 2-6). The lead and bismuth elements form a spallation target, i.e. a neutron source releasing a neutron flux and which is surrounded by a blanket medium (not numbered) containing a heavy water moderator 44 and part of a molten salt recirculation loop 94 (col. 11, lines 20-24).

The blanket medium, located within the cylindrical enclosure surrounding the inner enclosure 84, contains both the molten salt (e.g. $^{7}LiF/BeF_2$) and fuel material such as fertile or fissile materials (such as ^{233}Th or ^{238}U) as well as fission products thereof such as ^{233}U or ^{239}Pu (col. 10, lines 66 and col. 11, lines 22-25). The molten salt blanket medium is circulated through recirculation loop 94 to extract both heat (by means of the heat exchanger 96) and undesirable fission products (by means of a "processor" 48) (col. 11, lines 25-30). The waste material to be transmuted such as minor actinides and long-lived fission products such as TC-99 and I-129 can be inserted into containment means 98 located in a region of the blanket medium for irradiation and transmutation (col. 4, lines 18-19 and 41; col. 11, lines 31-34).

Neutron capture and fission reactions take place within the molten sale blanket medium. The neutron capture reactions by ^{232}Th or ^{238}U as well as by the intermediate species ^{233}Pa or ^{239}Np have a very significant probability of capture at neutron fluxes of the order of $10^{16}n/cm^2/s$. An even more important source of neutron interaction within the blanket medium is the fission reaction of ^{233}U or ^{239}Pu. These fission products also have significant neutron absorption cross-sections (this is why they have to be removed by the processor 48).

Since these products have known significant neutron capture absorption probabilities and cross-sections, the blanket medium creates an environment dominated by inelastic scattering events. The neutron scattering within such a blanket medium does <u>not</u> enhance the neutron flux in contrast to the diffusing medium of the present invention. Bowman's neutron flux is high because of the huge beam power of 400 MW (column 5, lines 7-10) and of the fission reactions.

The Bowman transmuter uses an intense accelerator-generated thermal neutron flux in the range of at least $10^{16}n/cm^2/s$ (column 13, lines 9-10). This is an order of twice the magnitude of what is typically used in the present invention as disclosed (see Table 5, page 48 of the present application). The intense thermal neutron flux is necessary in order to compensate for the low thermal neutron fission cross sections of minor actinides. Bowman relies on a double neutron capture process, in addition to decay, to achieve the required transmutation efficiency (col. 12, lines 10-34) instead of a mostly elastic scattering of a diffusing medium to enhance the neutron flux. Likewise, an intense thermal neutron flux is required to transmute long lived fission products like Tc-99 and I-129 which exhibits low thermal neutron capture cross sections. This explains why such products are distributed in a D_20 blanket (the blanket medium) in order to thermalize efficiently and reduce the parasitic captures as opposed to H_20 which is typically used with lower power flux.

Applicant asserts that Bowman, nor any of the other cited references, disclose or suggest all of the features recited in claims 1 and 17, and the claims depending therefrom. Specifically, among other things, the cited references do not disclose or suggest, among other things, a method of exposing a material to a neutron flux wherein neutron scattering within a diffusing medium substantially enhances the neutron flux, originating from the source, to which the material is exposed, as recited in claims 1 and 17. Accordingly, it is respectfully submitted that the pending claims are patentably distinct over the prior art of record and should be allowed.

8. The Rejection of Claims 21-22 as "Unpatentable" Over Bowman in View of Borst (U.S. Patent No. 3,197,375) Under 35 U.S.C. §103(a) Should be Withdrawn

Claims 21-22 stand rejected under 35 USC Section 103(a) as obvious over Bowman in view of U.S. Patent No. 3,197,395 to Borst. Claims 21 and 22 depend from Claim 17. Accordingly, for the reasons set forth above for the patentability of Claim 17, it is respectfully submitted that these claims are patentably distinct over the prior art of record.

9. The Rejection of Claims 31-32 as "Unpatentable" Over Bowman and in View of Ruddock (U.S. Patent No. 4,123,497) Under 35 U.S.C. §103(a) Should be Withdrawn

Claims 31-32 stand rejected under 35 USC Section 103(a) as obvious over Bowman in view of U.S. Patent No. 4,123,497 to Ruddock. Claims 31 and 32 depend from Claim 17. Accordingly, for the reasons set forth above for the patentability of Claim 17, it is respectfully submitted that these claims are patentably distinct over the prior art of record.

Accordingly, for these and other reasons, it is respectively requested that the claims should be allowed and proceed to issuance. Should the Examiner discover that there are remaining issues that could be resolved by an interview, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

Dated: November 20, 2006

By: _____
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